Building on Success: The Diffusion of e-Government in the American States

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Abstract: The purpose of this study is to determine what factors encourage the diffusion of Internet technology, or e-government, in the American states. Different dimensions of digital technology are examined by investigating the spread of both e-service and e-democracy. A longitudinal mixed linear model is used to test the direct effects of states' political, economic, demographic, and ideological factors on the states' efforts to adopt Internet technology over the first seven years of the new millennium. The results indicate that the adoption of Internet technology is a cumulative process; a state's preexisting digitalization is continuously built on progress in expanding the governmental digital services and outreach. States whose leaders are engaged in professional networks are more likely to adopt e-government. Institutionally powerful governors also encourage the adoption of on-line technology. The study concludes that the spread of Internet technology in providing services and expanding outreach fits the explanatory analysis of noncontroversial policies that are diffused by a process of emulation. Executive power, leadership, and professional networks reinforce this pattern of emulation.

Keywords: e-government, e-service, e-democracy, internet technology, emulation, leadership, professional networks

1. Introduction

One of the most rapid innovations taking place in state governments today is the increased use of the Internet to provide services and access to citizens. A recent study by the PEW Research Center on the States (2008a) found that states are using the Internet to make it significantly easier for citizens to do business on-line. In Michigan obtaining an air quality permit used to take from six to eighteen months; it now takes a matter of days. In many states a citizen is able to renew a drivers license or auto registration, pay a fine, or locate information on sex offenders or missing persons on-line. In over 20 percent of the states these services are provided in different foreign languages. States are also providing increasing opportunities for citizens and public officials to interact. This trend in public outreach and participation has made it easier for interested parties to seek information about specific issues, send comments to public officials, and even personalize communication. While few studies show that increased Internet access improves citizens' basic trust in political institutions, digital government does appear to improve perceptions of government processes (Tolbert and Mossberger, 2006; Larson and Rainie, 2002; Gibson, Lusoli and Ward, 2007).

All the states have made rapid progress in implementing Internet technology. For example, in 2000, 78 percent of the states offered no on-line services; in 2007 only 14 percent of the states were without these services (West, 2007). However, implementation of digital services and outreach has taken place much more rapidly in some states. The purpose of this study is to determine why some states have implemented this technology more aggressively and comprehensively than others. In doing so, we investigate theories of how and why Internet technology has spread among the states and why the unique nature of these reforms constitutes an opportunity for states to emulate the successful strategies of other states. Thus we seek to make a contribution to the research literature on the diffusion of public policy in the American states.

2. The concept of e-government

The term "e-government" is a comprehensive term that is sometimes referred to as "on-line government" or "Internet-based government." Dawes (2002) gives us a sense of the multidimensionality of the term when she states that it is "…the use of Internet technology to support government operations, engage citizens, and provide government services" (A Working Definition of Government, para 3). The first of these, government operations, primarily involves management practices that, although critical, are largely invisible to the public.[1]

[1] For a recent analysis and ranking of state management systems, see the PEW research center on the States' Government Performance Report, 2008a.

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This analysis will focus on the last two functions: 1) government's provision of services (e-services), and 2) government's attempts to engage citizens (e-democracy). Stahl's (2005: 4) use of the term e-government corresponds with the concept of e-service that includes "those aspects of public administration that have to do with the tasks of the executive." Typically these tasks involve service delivery, but they may also involve the interpretation or enforcement of laws. Public agencies employ an entrepreneurial model, that is, they strive to emulate the success of business in building efficiency and cutting costs. Governments seek to adopt approaches that are customer driven and are closely associated with the reinventing government reforms of the United States and the New Public Management reforms abroad (Tolbert and Mossberger, 2006; Ho, 2002).

Although online provision of services can be part of the democratic process, e-democracy implies a process where citizens have on-line input and influence on policy decisions (Stahl, 2005). This involves different features of digital government, that is, the establishment of channels of communication and public outreach. It allows the public information and access to legislative networks and other areas of policymaking. While an important goal of e-government is to improve citizens' lives by providing faster and more efficient services, there is a wider goal of increasing citizen participation in the process of governance and administration (Bolgherini, 2007).

West (2005: 8-9) maintains that Internet technology generally develops in four stages: 1) the billboard stage, 2) the partial service-delivery stage, 3) the portal stage with fully executable and integrated service delivery, and 4) interactive democracy with public outreach and accountability features. It is the implementation of the last stage, that is, e-democracy, that holds the greatest potential for transformational change. Not surprisingly, government bodies have been slow to incorporate technologies that enhance on-line participation. While public officials are incorporating significant changes in on-line service delivery, they are not as eager to use the Internet as a tool for system transformation (Ward and Lusoli, 2005; Wright, 2006). It may be that factors predicting the diffusion of digital outreach and participation are different from those that predict the diffusion of on-line services.

Observers note that the Internet has generally been more important in establishing communication networks outside of government than directly with government (Chadwick and May, 2003). This is exemplified in the U.S. by the Internet's role in political campaigns. More citizens, especially younger people, are using the Internet for campaign news, for information and videos of candidates, for sending and receiving messages from friends and organizations, and for making campaign contributions (PEW Research Center, 2008b). Still the use of on-line citizen access to and interaction with policy-making bodies and officials is expanding and, at the very least, is increasing both the ease through which citizens receive government information and the quality of that information (Nugent, 2001).

3. Internet technology in the states

Implementation of Internet technology in American state governments is taking place at a brisk pace. In his annual review of features available online in American federal and state websites, West (2007) documents changes that have occurred since he began his review in 2000. In 2000 only two percent of government sites offered three or more services online; in 2007 that figure was 58 percent. He notes that almost all sites now provide publications and databases (98 and 84 percent respectively). More and more sites offer privacy and security statements. Almost half the sites (46 percent in 2007) now comply with the World Wide Web Consortium (W3C) standards for disability access.

The most common services offered by the states include business registration, professional licensing, driver license and license plate renewal, filing and paying taxes, locating information on sex offenders and missing persons, and "Do Not Call List" registration. Many state legislatures offer bill and legislation search and live broadcasts of legislative sessions. In addition, many states offer unique services. For example, in New York and New Jersey, using Privacy Policy links, citizens may request any site information that is public record. Georgia citizens may search for the lowest gas prices in the state, and South Carolina legislators provide legislative broadcasts with closed captioning (West, 2007: 4-5).

Not only are states offering more services, many are attempting to make utilization of sites more user friendly. The PEW Research Center on the States (2008a) found that states are doing a measurably better job with web transactions than just three years ago. There is also a notably greater effort at public outreach. In 2007, 89 percent of government sites allowed the public to e-mail a public official

directly rather than simply e-mailing the webmaster (West, 2007). In some states, live updates are offered through RSS feed. West (2005: 106-107) describes interactive features such as "push" technology and website personalization. The former allows citizens to activate communication devices such as e-mails, newsletters, or direct mail that is sent out automatically, while the latter allows visitors to tailor a website to their own preferences. Push technology could assist and empower interest groups who would have access to the latest and most useful information. Personalization could assist individuals in wading through the abundance of information that often characterizes searches of the Internet.

While state implementation of digital services and outreach is changing quickly, there is considerable progress to be made. Most sites exceed the reading level of the average citizen. Many are poorly organized; portal pages make it difficult to navigate through the sites. Some sites have limited accessibility, while others have no apparent privacy provisions.

Table 1 presents e-government scores of the states based on data from West's 2007 review of 1,487 state websites. Two subcategories of e-service and e-democracy are separately presented. These indexes are on the scale of 100; 0 indicates no evidence of e-government and 100 indicates the highest e-government.

A state's ranking in the category of e-service measures the presence of online publications, online databases, audio clips, video clips, foreign language or language translation, various online services and the number of services, several indicators of security policy and privacy policy, disability access, and the level of user fees. In the case of the latter, we reversed the scores because a lower fee indicates a higher ranking. A state's ranking in the category of e-democracy measures the presence of e-mail addresses on the site other than the webmaster, the ability to post comments on the site through message boards, surveys, and chat rooms, the opportunity for citizens to register to receive updates regarding specific issues, the opportunity for citizens to personalize the site, and the provision of PDA access. In all three categories of e-government, e-service, and e-democracy, sites were assessed for average grade readability level.

Table 1: e-Government rankings of the states (West, 2007)

	E-GOVERNMENT		
STATE	E-SERVICE	E-DEMOCRACY	OVERALL
ALABAMA	46.30	27.00	37.20
ALASKA	45.40	31.40	40.10
ARIZONA	51.20	35.60	40.80
ARKANSAS	45.70	30.80	36.70
CALIFORNIA	53.30	42.20	46.00
COLORADO	51.30	33.60	41.70
CONNECTICU	60.30	37.80	44.20
DELAWARE	60.90	36.40	65.60
FLORIDA	48.10	38.00	40.80
GEORGIA	50.20	36.40	45.60
HAWAII	51.60	27.20	39.50
IDAHO	44.90	35.80	39.10
ILLINOIS	54.00	30.80	41.80
INDIANA	52.00	46.20	44.40
IOWA	46.70	39.20	41.10
KANSAS	47.30	39.40	40.40
KENTUCKY	49.30	42.80	56.20
LOUISIANA	47.60	43.40	41.90
MAINE	58.10	38.80	62.00
MARYLAND	42.30	36.20	53.50
MASSACHUSE	51.40	36.40	53.80
MICHIGAN	54.80	47.20	64.00
MINNESOTA	48.50	44.80	44.40
MISSISSIPP	33.00	31.80	33.10
MISSOURI	53.90	39.40	42.90
MONTANA	54.50	38.00	46.90

	E-GOVERNMENT		
STATE	E-SERVICE	E-DEMOCRACY	OVERALL
N CAROLINA	50.00	37.40	42.50
N DAKOTA	57.00	29.00	42.60
NEBRASKA	57.80	36.40	44.30
NEVADA	42.70	31.40	38.10
NEW HAMPSH	53.60	42.80	41.00
NEW JERSEY	58.20	44.20	50.00
NEW MEXICO	36.70	31.20	32.90
NEW YORK	49.30	36.00	43.50
OHIO	49.10	32.80	42.60
OKLAHOMA	44.80	33.40	44.90
OREGON	52.90	44.00	44.30
PENNSYLVAN	51.20	39.40	43.70
RHODE ISLA	48.50	35.20	41.70
S CAROLINA	46.70	36.80	42.50
S DAKOTA	48.50	36.60	39.00
TENNESSEE	54.30	38.60	54.10
TEXAS	60.00	45.40	51.30
UTAH	54.30	38.20	47.00
VERMONT	46.80	32.00	38.20
VIRGINIA	46.90	33.80	39.30
W VIRGINIA	33.70	31.00	31.40
WASHINGTON	53.20	42.40	42.40
WISCONSIN	46.90	33.80	38.40
WYOMING	29.30	26.60	28.60
Total Mean	49.50	36.70	43.76
Source: West (2007), Min=0, Max=100			

The top five sites overall are Delaware, Michigan, Maine, Kentucky, and Tennessee. The top five e-service sites are Delaware, Connecticut, Texas, New Jersey, and Maine. The top five e-democracy sites are Michigan, Indiana, Texas, Minnesota, and New Jersey. Although states which rank high in e-service are more likely to rank high in e-democracy ($r=.504$, $p \leq .001$), this does not always occur. The state of Delaware is a good example of the exceptional cases (See Table 1).

4. Explaining the differences in state innovation of e-government

Traditional explanations for the diffusion of policy in the states include a vast spectrum of geographic, political, economic, demographic, and ideological variables. The utility of these explanations depends largely on the type of public policy under scrutiny. For example, Hwang and Gray (1991) note that political factors are more important in the adoption of redistributive policies; economic factors are more influential in the spread of developmental policy. Certain "moral" issues such as abortion will be affected more by demographic and ideological factors (Mooney and Lee, 1995). Opheim (1996) found that states characterized by Elazar's (1972) "moralistic" political culture were more likely to make efforts to inform and educate the public about legislative activity.

In his comprehensive review of diffusion policy in the American states, Karch (2007) states that geographical proximity has played a traditional role in explanations of policy diffusion, but that it has become less influential because of "changes in communication and transportation technology…which make it easier to acquire policy-relevant information from far-flung states" (2007: 58). He presents three alternate explanations of policy diffusion: 1) imitation; 2) emulation; and 3) competition. Imitation results when states are encouraged to adopt policies of other states that have shared characteristics; ideological and resource similarities may encourage one state to adopt a policy implemented in another. For example, states who share demographic and geographical characteristics will almost certainly examine and adopt successful immigration policies of similar states. Grossback, Nicholson-Crotty, and Peterson (2004) find evidence of imitation in the adoption of lotteries and criminal sentencing guidelines.

Emulation occurs when a policy is diffused because leaders perceive it to be a success in those states that initially adopt it. The assumption is that officials learn from the success as well as the problems of other states. Volden (2006) identifies the process of emulation in his interviews with

administrators of the Children's Health Insurance Program (CHIP). Unlike imitation, which tends to involve policies with ideological or partisan characteristics, policies diffused by emulation tend to be noncontroversial; emulation most likely occurs in "relatively non-political settings" (Karch, 2007: 64). Hayes (1996), in his analysis of policies with varying levels of controversy, finds that states tend to increase the comprehension of innovation over time, but that this pattern is strongest for the least controversial policies.

Communication regarding the success of innovation is facilitated by the development of national media and professional networks (Walker, 1969; Grupp and Richards, 1975; Mossberger, 2000). McNeal et al. (2003) find that administrative reforms are likely to be driven by states' professional networks whose leaders perceive and appreciate the success other states have achieved. These authors examined the role of professional networks in diffusion of Internet technology and found them to be significant. In their analysis of the diffusion of health care policy, Carter and LaPlant (1997: 24) conclude that expanding channels of communication and the "explosion of national conferences and associations" may render geographic proximity less influential. Lieberman and Shaw (2000: 236) find that "media reports and professional networks of state policymakers and administrators appear to be important means of diffusion of welfare policy innovations…"

Competition is most likely to explain the diffusion of policy that puts states at an advantage among other states (or avoids states being put at a disadvantage). The most obvious type of policy to be explained by this theory is economic development policy (Karch, 2007: 62). Incentives to attract business, welfare policy, and lottery adoptions are examples of policies that may be diffused primarily because of competition among the states.

We theorize that emulation provides the most useful explanation of the diffusion of e-government among the states. Digital technology falls into the tradition of reinventing government reforms that have widespread appeal among administrators. The drive to increase efficiency and enhance customer service is universal among reform minded executives, and the latters' rhetoric extols opportunities for outreach and citizen engagement as an important potential advantage of Internet technologies. Karch (2007: 61) notes that the success of policy initiatives can sometimes be difficult for policy-makers to evaluate. But it seems that adoption of Internet technology, especially the acquisition of on-line services, could be more easily evaluated in terms of cost efficiency. Thus the success of these initiatives might be more easily disseminated.

However, it is also possible that imitation plays a role in the adoption of digital services and outreach. Indeed, it is reasonable to assume that imitation and emulation are not always mutually exclusive. Technology reform may be influenced by ideological or resource variables. Offering state services on-line reflects the e-commerce paradigm. As noted, one of the most positive aspects of e-government is efficiency, the ability of governments to deliver the same or better services at lower costs (Stahl, 2005). While cutting costs is an objective for both liberal and conservative leaders, emulation of the business model has long been the purview of fiscal conservatives. Indeed, McNeal et al. (2003) find evidence that Internet services are more likely to be present in states with Republican-controlled legislatures.

Because of the initial and ongoing developmental costs of Internet technology, it is reasonable to assume that states with more resources would develop digital services and public outreach more rapidly. Using 2000-2003 data, West (2005) finds a relationship between states' per capita income and the percentage of state agencies offering on-line services. In their analysis of 2000-04 data, Tolbert, Mossberger, and McNeal (2008) find that technology reform was not associated with traditional notions of "slack resources," that is, gross state product. However, diffusion is more likely to occur in states with greater "resource environments" as measured by median household income, education, and urbanization. They also find an association between diffusion and states dominated by Republican legislatures. Thus states that are similar in resource availability and/or ideology may adopt digital technology more quickly and comprehensively.

The increasing presence of the web leads us to speculate that Internet services and outreach may be a function of citizen demand. The presence of a "problem environment, that is, a gap between citizen expectation and public policy (Nice, 1994), may mean there is public pressure on government to adopt a larger on-line presence, particularly for on-line services and information. However, there has

been little evidence that public pressure has played a role in the diffusion of e-government (McNeal et al., 2003; Tolbert et al., 2008).

Finally, Karch (2007: 71) emphasizes the significance of time as a determinant of policy diffusion. With regard to e-government, one would expect the initial adoption of digital technology to represent the biggest hurdle. Instituting electronic services and outreach requires significant start-up effort and the institution of a supporting infrastructure. Indeed, in their 2008 analysis Tolbert et al. reveal that institutional capability is a significant predictor of states' implementation of e-government. However, unlike Tolbert et al., we are proposing that time itself separated from or combined with the increase in institutional capacity is the key factor in states' continuous digitalization and diffusion of e-government. Once the initial investment is made, time creates a cumulative effect. That is, we would expect states that initially adopt this technology to make steady progress as technological infrastructures institutionalize and support development of digital services and outreach. Although digital services and outreach is generally accompanied by institutional support systems, the latter more likely result as a *product* of digital technology not as factor in its diffusion.

As a result of Karch's theoretical foundation and other scholarly studies, we develop and test the following hypotheses:

- Emulation Hypothesis: The diffusion of Internet services and outreach is a function of the emulation of the success of these policies by administrative reformers. Evaluation of the success of on-line technology is easily evaluated and is disseminated through professional networks.
- Imitation Hypothesis: The diffusion of Internet services and outreach is a function of the imitation of these policies by public officials in states with similar resources and ideology.
- Citizen Demand Hypothesis: The diffusion of Internet services and outreach is a function of citizen demand for these services. Citizens in states with a greater web presence generate demand for services. Citizens in states with higher political participation rates generate demand for electronic accessibility and interaction.
- Accumulation of Time Hypothesis: The diffusion of Internet services and outreach is a function of states' accumulated e-government effort over time. A state's preexisting e-government capacity results in the development of institutional capability, which in turn encourages greater sophistication and comprehensiveness of continuous governmental digitalization.

5. Data and variables

The data for the dependent variable(s) come from Darrell M. West's seventh annual update on the features that are available on-line through American state websites (2007). West evaluates 1,487 state websites covering all 50 states. An average of 30 websites is studied for each individual state. Each state received an overall ranking, and states are also given relative rank scores for each of 15 different website criteria. From West's overall and 15 different individual criteria in states' e-government trends, we reconstruct the concept of e-government into three different dependent variables. The first, from West's overall e-government scores on the scale of 100, are used to establish a general index of e-government.

The second dependent variable, the e-service index, is a combined score of ten of the 15 provisions West adopts including criteria such as foreign language option, lower subscription fee, disability service, privacy policy option, level of security, number of service types, and other open information distribution options for government publication, data, and other audio and video devices. In order to make this e-service index consistent with the scale of West's overall e-government score, the sum of these ten categories are averaged and then rescaled on the scale of 100.

The third dependent variable, the e-democracy index, is a combined score of five criteria: whether states' websites have direct email communication options; whether they allow public comments; whether they provide regular notifications for information updates; whether they let members of the public personalize their own ways of site usage; and whether they are accessible through personal electronic devices. Averaging and rescaling the five items on a scale of 100 creates the index in a same manner as the e-service index.

To test the emulation hypothesis we include the following independent variables in our model: state participation in professional networks and the institutional power of the state's governor. The

measure of state participation in professional networks indicates whether or not a state had representation on a leadership panel for the two most important state organizations: the National Council of State Legislatures (NCSL) and National Governors Association (NGA). Just as in the McNeal et al., 2003, a dummy variable measures the following: 1 if the state had representation on the NCSL or NGA, 0 if it did not.[2]

An active and energetic governor will often be a leading force for administrative reform and entrepreneurial government (Osborne and Gaebler, 1992; Durning, 1995). A governor who wants his/her state to lead the way can "overcome bureaucratic intransigence, find resources that facilitate innovation, and resolve group conflict that slows down the pace of diffusion" (Karch, 2007: 14). In their comprehensive study of administrative reform in the American states, Brudney, Herbert, and Wright (1999) found that agencies whose directors were directly appointed by the governor were more likely to initiate reform. For this reason, we include Beyle and Ferguson's measure of the institutional powers of the governor (2008).[3]

To examine the imitation hypothesis we included the following variables: legislative professionalism, states' per capita income, party control, and ideology score. As in earlier studies (McNeal et al., 2003; Tolbert et al., 2008) legislative professionalism is used as a proxy for the state's institutional capacity and the state's level of professionalism in general. We use Squire's 2003 index of legislative professionalism that combines measures of salary and benefits, time demands, and staff and resources.[4]

The measure of party control used in this study is the percentage of Democrats in the state legislature. We apply the Ranney Index (1976), as recalculated and updated by Holbrook and La Raja for 2003-2006 (2008).[5] A score of 1 indicates complete Republican party control, while a score of 0 indicates absolute Democratic party control. We employ per capita income to measure the economic resources of the states (Council of State Governments, 2008).

To explore the ideological implications of e-service and e-democracy, we apply the policy liberalism index constructed by Gray (2008). Using ordinal data, the index combines and ranks states using five issues on which liberals and conservatives traditionally differ: gun control, abortion, welfare eligibility and work requirements, tax progressivity, and unionization. We anticipate that e-government, and e-service in particular, is influenced by the ideological appeal of cost saving and is more likely to be adopted by states with conservative climates.

Consumer demand for Internet services may be generated by a population characterized by heavy Internet use (McNeal et al., 2003; Mooney and Lee, 1995). We adopt percentage of households using the Internet either in or outside the home or in both places in each state (NTIA, 2007) to observe how the proportion of Internet users within states influences state e-government trends. In addition, because states with greater proportions of minority residents may experience the so-called "digital divide," we might expect less demand for digital services and outreach in states with heavy concentrations of ethnic minorities. We include a measure of the ratio of Hispanics and Blacks to Whites to examine the effects of this demographic variable (U.S. Census, 2007).

Demand for digital government may also be greater in states with participatory political cultures. Level of participation might have particular application to states with on-line features that are represented in e-democracy. An energized citizenry may demand more electronic access to policy information and public officials (Peters, 2001), and there is evidence that government web site users

[2] This measure is an update of the same used in McNeal, et al., 2003 with some revisions. There are only 10 (not eleven) positions used for NCSL because one representative was from Canada. For the NGA there were 9 Executive Committee members, 4 Standing Committees (not five) and no e-government committee. Thus the NGA numbers were 13 (not 17). The status was measured in the term of 2007-08.

[3] The index combines scores on the strength of the following six powers: separately elected state-level officials, tenure potential, power of appointment, control over the budget, veto power, and party control.

[4] In his article Squire makes a convincing argument for the timeliness of his measure, comparing state scores over a number of years that reveal little change from year to year. Thus we are comfortable using the 2003 index to predict 2007 digital trends.

[5] This measure included the average percentage of the popular vote won by Democratic gubernatorial candidates; the average percentage of seats held by Democrats in the state senate, in all legislative sessions; the average percentage of seats held by Democrats in the state house of representatives, in all sessions; and the percentage of all gubernatorial, senate, and house terms that were controlled by the Democrats. For each state these four percentages were averaged to create an index value representing the degree of interparty competition. For a convenient interpretation of the analysis result for Republican Party control, we reverse-coded the Democratic party control index.

compare favorably with the general population for civic engagement (PEW Research Center, 2000). We include the average rate of voter turnout in the states for President, Governor, U.S. Senate, and U.S. House of Representatives from 2003-2006 as the measure of political participation (Holbrook and La Raja, 2008).

Since our study also seeks to control for the way previous trends of state government digitalization have proceeded, that is, to control for the effects of time, we utilize the yearly scores of e-government, e-service, and e-democracy from 2001 to 2007 rather than by simply adopting states' static levels of digitalization of the current year. In other words, government digitalization of 2007 was gradually built upon state governments' other assets combined with the states' preexisting levels of technology capacity. Thus time variations are considered as both mediator and moderator in the model structure.

6. Analysis

We use Proc Mixed in SAS 9.1 to develop a longitudinal mixed linear model of state government digitalization in the relationship with political, economic, demographic, and ideological factors counting for a cumulative effect of digitalization over time. We utilize the fitted linear model with the AR(1) structure of error covariance matrix in order to explain time variations from 2001 to 2007. The AR(1) is realistic and is often assumed in situations when data are collected at equispaced time intervals and where observations close to each other in time duration are likely to be more closely associated (Diggle et al., 2002).

Therefore, our model structure considers auto-correlations of yearly state government digitalization that is likely to be more closely associated in short distance years. In other words, the dimension of a state's e-government of year 2007 is more closely related to the level of the e-government of year 2006 than to the e-government scale of year 2005. Having the structural function in the model, we are able to control random variation of yearly changes. The model included time ($\chi1$=0 (2001), 1 (2002),… , 6 (2007)), Republican party control ($\chi2$), per capita income ($\chi3$), minority ratio ($\chi4$), voting turnout ($\chi5$), institutional power of governor ($\chi6$), policy liberalism ($\chi7$), professional networks ($\chi8$), households using internet ($\chi9$), and legislative professionalism ($\chi10$) to explore multiple factors of traditional states' assets that influence state government digitalization.

$$Yij = \beta0 + \beta_1\chi1 + \beta_2\chi2 + \ldots + \beta_9\chi9 + \beta_{10}\chi10 + \epsilon_{ij,} \text{ where } \epsilon_i \sim N(0, \sum)$$

7. Results

Analysis of the overall e-government scores clearly shows support for the emulation theory of policy diffusion. Table 2 indicates that the overall e-government scores (Min=0, Max=100) are positively related to participation in professional networks (t=2.18, p≤.035) as well as the institutional power of the governor (t=3.27, p≤.002). States participating in professional networks tend to have 2.4 points higher e-government scores than states without representation in professional networks. States that grant stronger institutionalized powers to their respective governors are more likely to have, on average, 4 points higher e-government scores than states without such gubernatorial power.

The influence of professional leadership networks for the dissemination and adoption of on-line technology is also evident when we break the dependent variable into e-service and e-democracy. States' representation on professional networks, such as the National Council of State Legislatures (NCSL) and National Governors Association (NGA), is positively related to the level of states' online services. States that participate in professional networks tend to have, on average, 3 more points in e-service than do states that have are not involved (t=2.10, p≤.042). States' representation in professional networks also influences adoption of e-democracy measures. States with professional networks have 2 points higher e-democracy scores compared to states without such networks (t=2.28, p≤.028) (See Table 2).

The yearly accumulation of a state government's digitalization is a significant factor in determining the current levels of e-service and e-democracy of the state. On average, the e-service (Min=0, Max=100) score has increased 4.17 points every year since 2001 (t=18.23, p≤.001). In addition, states have improved their digital outreach (Min=0, Max=100) by about 3 points yearly since 2001 (t=18.59, p≤.001). This indicates that a state with a level of digitalization capacity continuously and gradually improve their level of on-line service for and outreach to the public (See Table 2).

Our analysis shows little support for the imitation and citizen demand hypotheses. Unlike studies using earlier data, legislative professionalism did not predict diffusion of Internet technology. The latter is not a function of a state's per capita income, its ideological climate or its racial characteristics. Nor does citizen participation influence officials' decisions to offer opportunities for citizen interaction. Indeed, higher voting turnout has a negative effect on state governments' online service (t=-2.31, p≤.026) (See Table 2).

Table 2: Multiple regression analysis of e-service, e-democracy, and e-government

	E-Service		E-Democracy		E-Government	
	Coef.	t (p)	Coef.	t (p)	Coef.	t (p)
Constant	37.194**	2.48 (.018)	27.897***	3.13 (.003)	47.647***	4.23 (.001)
Time	4.174***	18.23 (.001)	3.041***	18.59 (.001)	.251	1.22 (.222)
Republican Party Control	-6.965	-1.36 (.181)	-3.302	-1.09 (.283)	-3.933	-1.02 (.312)
Per Capita Income	.001	.68 (.500)	-.001	-.99 (.330)	.001	.04 (.972)
Minority Ratio	-7.522	-1.31 (.197)	-1.798	-.53 (.599)	-5.628	-1.31 (.198)
Voting Turnout	-.326**	-2.31 (.026)	-.058	-.69 (.496)	-.205	-1.93 (.060)
Ins. Power of Governor	2.763	1.68 (.101)	1.591	1.63(.110)	4.034***	3.27 (.002)
Policy Liberalism	-.095	-1.39 (.172)	-.038	-.92 (.362)	-.067	-1.31 (.199)
Professional Networks	3.127**	2.10 (.042)	2.006**	2.28 (.028)	2.434**	2.18 (.035)
Households using Internet	-.025	-.17 (.865)	-.101	-1.16 (.253)	-.095	-0.86 (.393)
Legislative Professionalism	1.490	.21 (.835)	6.161	1.46(.151)	1.850	.35 (.730)
σ^2	50.524		28.258		43.979	
P	0.574		0.307		0.325	
-2*Max.loglik.	2239.84***		2137.53***		2283.27***	

***p≤.01, **p≤.05, *p≤.10

8. Conclusion

The process of diffusion of this particular administrative reform, that is, the provision of citizen services and outreach over the Internet, seems to be driven by state leaders' desire to emulate the technological advances of other states. We discover that these leaders may disseminate information about the nature and success of these reforms through professional leadership networks. Although an assessment of the actual success of these policies is beyond the scope of this project, the implication is clear. Efficiency and cost savings are outcomes that may be easily evaluated by state leaders. Hence the tendency to emulate other states' successful efforts creates impetus for reform.

In addition, it appears that the preexisting levels of state governments' digitalization and the cumulative effects over time enhance the exponential diffusion of this policy. Success itself breeds success, confidence, and support. As states add on-line technology, the momentum for adoption is often propelled by the addition of institutional infrastructure and support services. The increase in institutional capability, as well as executive and legislative support, spurs on-going efforts to develop and improve this new technology.

Reflecting earlier research, this study also reveals that digital reforms are more likely to be a top-down process rather than a result of citizen demand. Powerful governors, responding to suggestions and encouragement from state officials, may provide strong commitment of public resources to e-government.

Unlike studies using earlier data, we find little evidence of the imitation model of policy diffusion. This is not surprising given the rapid pace of technology reforms. States do not necessarily adopt digital technology as a result of their economic or ideological similarities to other states. These days the

appeal of greater efficiency and access applies to administrators in both Democratic and Republican controlled states and regardless of economic status. Participatory political cultures, as measured by heavy voting turnout, do not reveal a direct positive relationship between higher levels of digital services or citizen interaction.

We find no significant differences in factors that predict the spread of e-services as opposed to e-democracy. The absence of this distinction may be explained by the fact that citizen use of the Internet falls primarily into what Chadwick and May (2003) refer to as a "consultative" rather than "participatory" model of interaction. The opportunity for citizens to e-mail government officials, post comments, personalize websites, and engage in informal chatting allows interested and motivated citizens the opportunity to enhance and personalize information and express their thoughts and opinions. However, it does not automatically translate into transformational changes that increase public officials' responsiveness and/or accountability. Hence, e-democracy in American state governments in its present form fits the theoretical model of emulation as the primary pattern of diffusion of noncontroversial policy initiatives.

Our findings seem to confirm the notion that the adoption of Internet technology by political leaders follows the incremental model of change. Government officials are cautious in adopting technology that may have the potential to transform the system. They are motivated by a "managerial" incentive to increase the flow of information to citizens and groups and to enhance the delivery of services to customers (Chadwick and May, 2003: 272). Leaders' adoption of digital technology is steady and measured. It appears they are examining the adoption of this policy in other states and are emulating a process they are convinced is at least relatively successful.

However, as digital technology becomes more widespread and sophisticated, many believe there is the potential for transformational change in American state and national government. Quinn (1992) maintains that the cumulative impact of steady, incremental change over time is major. West (2007) compares the adoption of digital technology to the long and generally complex set of events that characterized the development of the automobile in the first half of the 20th century. As the adoption of digital services and outreach continue at steady pace in American governments, opportunities exists for future researchers to examine the nature of this change.

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